



# How the Fertilizer Industry Can Help

Dr. Robert Mikkelsen, Vice President  
Merced, CA



Agrium Inc.



Arab Potash Company



BHP Billiton



CF Industries Holdings, Inc.



Compass Minerals Plant Nutrition



International Raw Materials LTD



K+S KALI GmbH



LUXI Fertilizer Industry Group



The Mosaic Company



OCP S.A.



PhosAgro



PotashCorp



Yara (QAFU)



Shell Sulphur Solutions



Simplot



Sinochem Holdings Limited



SQM



Toros Tarim



Uralchem, JSC

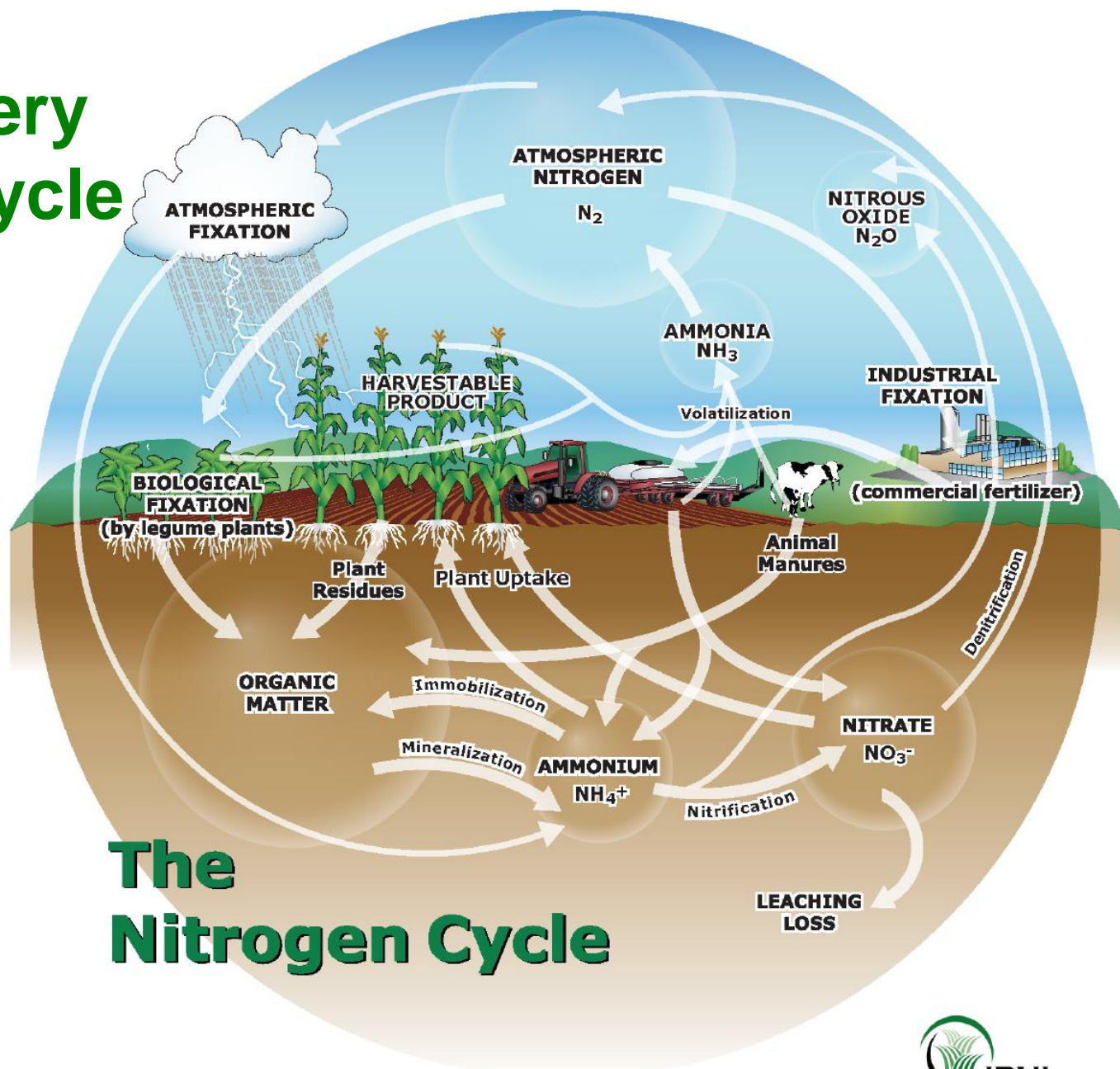


Uralkali

The International Plant Nutrition Institute is supported by leading fertilizer manufacturers.

Its mission is to promote scientific information on responsible management of plant nutrition.

This is a very  
complex cycle  
to manage



## The Nitrogen Cycle



## 4R Principles of Nutrient Stewardship



### RIGHT SOURCE

Matches fertilizer type to crop needs.



### RIGHT RATE

Matches amount of fertilizer to crop needs.



### RIGHT TIME

Makes nutrients available when crops need them.



### RIGHT PLACE

Keeps nutrients where crops can use them.

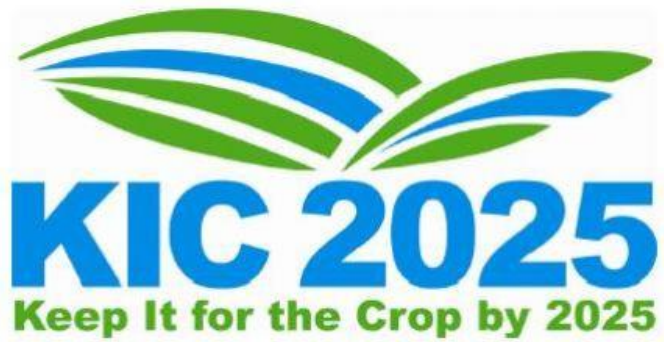
## 4R Nutrient Stewardship

# 4Rs OF NUTRIENT STEWARDSHIP

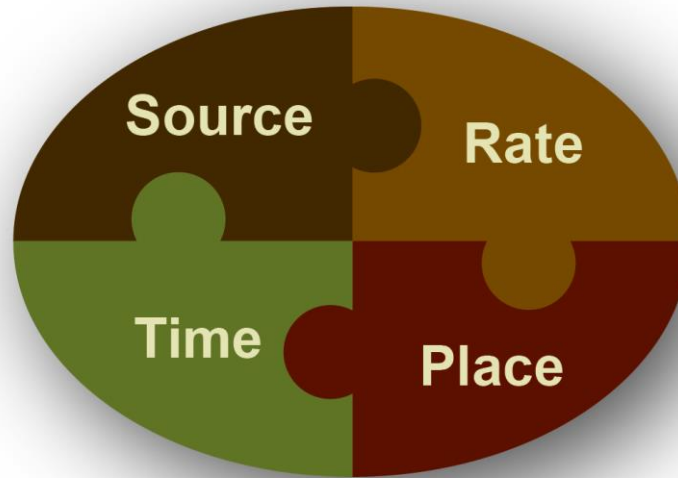
Economically, Environmentally & Socially  
Sustainable Crop Nutrition



The 4Rs promote best management practices (BMPs) to achieve cropping system goals while minimizing field nutrient loss and maximizing crop uptake.



Illinois Agricultural Industry Group



Ohio Fertilizer  
Dealer Certification



Mid-West Industry/  
University Partnership



# Certified Crop Adviser Specialties



- 4R Nutrient Management Specialist
  - Performance objectives effective May 2015
  - Currently 100 certified 4R Nutrient Management Specialists

A screenshot of the United Prairie website. The header includes the United Prairie logo with the tagline "Celebrating 20 Years of Innovation" and navigation links: Home, Who We Are, Agronomy, UP Trial Results, Financial Services, Contact Us, and Careers. There are also links for Customer Login and Employee Login. The main content area features a photo of seven men in blue shirts, with a banner above them stating "2015 Environmental Respect Award State Winner". Below the photo, there is a section titled "United Prairie Agronomic Professionals Earn 4R Certification". To the right, there is a "News" section with a link for "More News" and a headline: "BREAKING: 2013 WEST TEXAS TRAGEDY RULED A 'CRIMINAL ACT'" dated May 12, 2016.

Experiences from Europe:

## Germany:

The entire country is a vulnerable zone, implementing drinking water protection and “good agricultural practices”

Upper surplus N limit allowed based on a farm balance

20-year experience has found gradual acceptance and improvement

### Nutrient balances: Regional aspects

